

# Hobbies

## WEEKLY

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DESIGN SHEET FOR  
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## How the amateur handyman can make A PHONO FIDDLE

THIS is quite a good musical instrument, and attained some popularity not long ago. As it is being revived again, some particulars on making one are given. It may be mentioned that a special soundbox and horn used to be sold by the inventor, but these do not now appear to be on the market, but a successful instrument can be made with one of the ordinary pattern of soundbox, and any old horn will usually serve.

Many readers may already possess a soundbox from a gramophone, also a horn, perhaps, but if not, almost any music shop could supply one. The most

suitable pattern of horn is one of the small aluminium type, common to the now obsolete phonograph.

For the stock of the instrument obtain a piece of hardwood, beech or mahogany, if possible, 1in. thick, 2in. wide and 31in. long. Also required are two pieces of  $\frac{1}{4}$ in. thick fretwood, to size in Fig. 2. The pieces should be let into the stock flush with the surface, as in Fig. 1, and there be secured with a single screw each end.

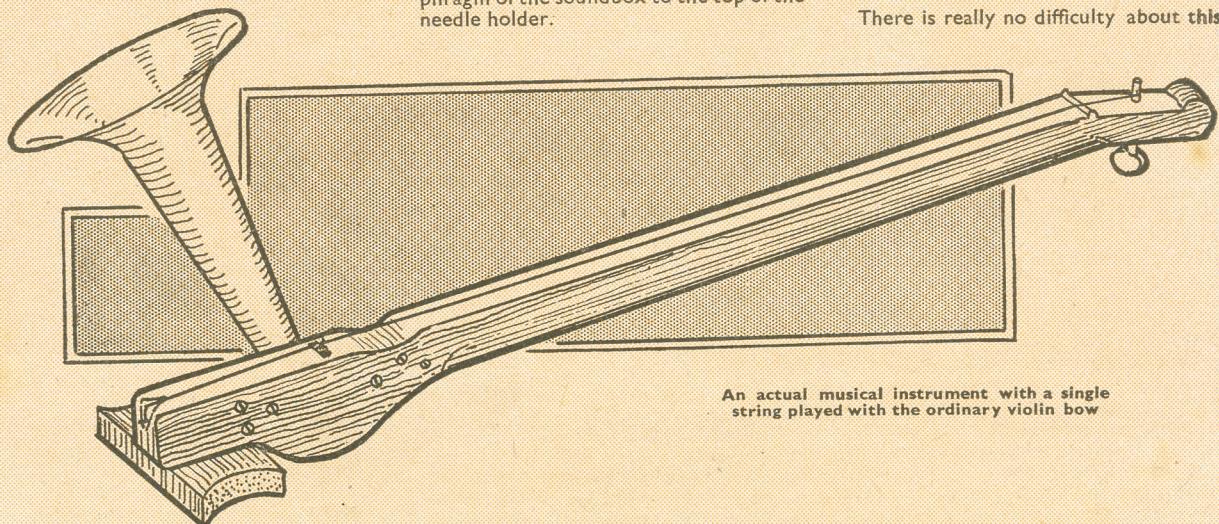
Now remove the offside piece of fretwood, mark a line across its centre, and on this line make a mark the same distance down from the top as the distance from the centre of the diaphragm of the soundbox to the top of the needle holder.

On the mark bore a hole the size of the soundbox tube, sticking out at the back, then, if the soundbox is fitted in the hole, the top of the needle holder will be level with the top edge of the fretwood panel. This should be quite clear on studying Fig. 3, which shows the soundbox in position.

The soundbox should now be fixed to the panel, and about the best method is to remove the needle bar and diaphragm, drill two holes in the back of the soundbox and screw through the holes into the wood. The screws should be well countersunk. The diaphragm and needle bar can then be replaced.

### An Alternative

There is really no difficulty about this



An actual musical instrument with a single string played with the ordinary violin bow

operation, if care is taken; the alternative being to solder or screw a metal bar to the back of the soundbox outside, and to screw the bar to the wood. The soundbox must be firmly fixed in either case.

Now remove the second wood panel, and then cut away enough of the stock to admit the soundbox as well as its fretwood panel. Fig. 3 shows how the wood is cut away and the soundbox snugly fitting between. Make sure that the needle hole lies in the centre of the

shaping up at home. A hole for this is bored in the neck in the usual spot, and should be a tight fit for the key.

At the top of the neck a piece of stout metal or wire should be inserted in a saw kerf, as in detail (D) in Fig. 4. This is for the string to pass over. At the bottom end of the stock a piece of thin metal is cut diamond shape and bent over, as at (A). In this a small round-headed screw or nail is driven to which the string can be hooked over.

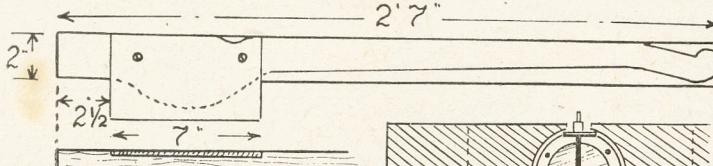


Fig. 1—Side view and detail of neck

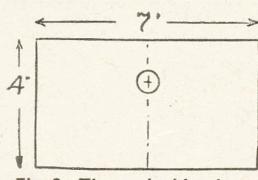


Fig. 2—The neck side pieces

stock; a little packing will help here if the hole does happen to be on one side.

Refix both panels, then shape up the stock according to the outline in Fig. 1. The wood can be cut to the shape quite easily with a bow saw. Note the hollow in the top of the stock just away from the needle hole. Underneath, from the end of the panel to the beginning of the neck, just the part traversed by the hand, round off very neatly. Clean the stock up with a good rub over with glasspaper. A few additional screws can now be added to fix the wood panels more firmly to the stock, as the whole must be rigid, or the instrument will not remain in tune.

#### Tightening Key

The key for tightening the string is better bought ready made at a music shop; it is not worth the trouble of

Fig. 3—Showing soundbox in place

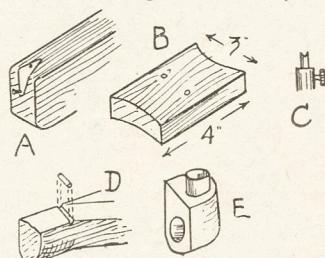


Fig. 4—Details of shaping

A piece of steel wire is required; this should be of a gauge to fit the needle holder. It is fixed in and cut short to stick out about  $\frac{1}{8}$  in. above the stock. A notch for the string to lie in is carefully filed, as shown at (C). Take care here to smooth with emery cloth the edges of the notch so that it cannot cut the string as it is tightened.

As there is no body to the phonofiddle, like that possessed by the violin, a fitting is added which can be gripped between the knees of the player. This is a piece of stout hardwood, cut and shaped

#### Child's Chair—(Continued from page 163)

Large dome-headed brass upholstery nails should be used—spaced closely and evenly all round. Finish along the edge of the seat by draping the covering over the actual edge of the wooden seat and finish along underneath it by driving in more nails or broad-headed tin tacks. The padding to the seat back should not be so thick as that for the seat. The nailing or pinning should be just as neatly, and evenly carried out.

#### Finish

The whole of the woodwork should receive a final cleaning with coarse and fine glasspaper. Then give a coat of ordinary white oil paint. After this has had a day or two to harden thoroughly, give it a light rubbing off with fine glasspaper. The finishing coat of glossy or matt cream enamel may then be added.

Some workers may like to add a little

decoration to the sides to make the seat more interesting for the youngsters. Nursery transfers are obtainable now and would make an attractive finish. For those skilled with the pencil and brush we give alternative suggestions for the side decoration.

An enlargement of either of the pictures, shown in Figs. 3 and 4, could be made by lining in a number of squares in pencil lightly over the pictures, and on a sheet of paper a similar number of squares made large enough to fit the full-size ends. Thus the enlargement can be made by carefully following each square.

Outline the whole then in a thin line of brown or neutral colour paint and clean off any pencil lines with soft rubber that may appear on the surface. The outline of the animals, be it understood, will be transferred to the painted sides in

as at (B), and is fixed below the stock at the end. Strips of felt should be glued over the curved ends to make a grip better and prevent marking one's trousers.

At this stage the instrument can be finished with a light stain and polish. The finger board portion needs no polish, but should be stained black and polished up by a rubbing over with a soft cloth.

Marks can be scratched across the finger board, as a guide to correct positioning for playing the instrument. Of course, frets can be pressed in saw-kers for this purpose, as is more usual, and look much more professional. The correct positions for the frets can be easily found by practise on the instrument.

#### The Horn Portion

The horn, if of the curved type, can be fitted on easily enough, the end of the pipe of the soundbox projecting from the side of the stock being quite long enough to hold it. If a straight horn has to be used, then obviously a bent elbow will be needed. Sometimes such an elbow can be picked up at the shop, there used to be enough of them, or one could be made by the player himself, with a short piece of suitable tubing, bent to right angles.

Admittedly this is a difficult job for the amateur without metal working tools, and perhaps knowledge, but a quite good elbow can be made by anyone adopting this method. Cut a small block of hardwood, and in one side bore a hole half-way through the block, of a size to admit the tube of the soundbox.

On the top of the block bore a hole to admit a piece of metal tube the right size to enter the horn. Bore this hole until it enters the hole already bored for the tube in the side. Glue the tube in, and then shape up the block, as at (E) in Fig. 4. Not too elegant a job, perhaps, but it will serve its purpose.

To complete the instrument a wire banjo string will be needed, and of course, the requisite bow. Then you can start playing right away.

pencil or by carbon paper.

Paint up the rabbit in natural colours of brown with the carrot and its greenery and background leaves in bright appropriate colours.

If the elephant picture is chosen, carry this out in pale grey with bright colours as backing and ground colour. The back covering to the elephant should be bright, say, crimson vermillion, with the initial of the lucky youngster who is receiving the seat carefully painted in yellow or gold.

#### To Clean Tin

To get paint off a piece of tin, is to hold it with pliers in front of a blow-lamp or small flame. Then peel the paint off with a penknife. This is much better than using glasspaper or emery cloth.

# Any youngster would be delighted to have this TINY TOT'S CHAIR

WHAT youngster would not love to have a little chair, such as that shown here, all to itself? And with what pride and delight such a gift would be received. A chair of such simple construction and finish would not take long to make, and the actual finish of paint in some colourful shade would make the whole thing very attractive.

To the extreme top of the back, the chair measures  $20\frac{1}{2}$  in., and the width of the seat is 11 in. Wood  $\frac{1}{2}$  in. thick is used throughout, and we suggest ordinary grooved and tongued soft-wood boards for the sides, the seat and the back. Planed-up stuff can be used for the feet rails and the support rails inside to take the seat and back.

## The Sides

Commence by making the sides, and here some little attention must be paid to the setting out of the simple curved top. Three 5 in. boards not less than 14 in. long should be procured. The grooves of two of them are brushed with the glue, and the tongued boards driven in until the two edges are perfectly flush and a good joint made. Then measure off the 13 in. in width, as shown in the constructional diagram Fig. 1, and cut and plane away the unwanted wood on the right of the two full-width boards.



Fig. 3—Outline of decoration

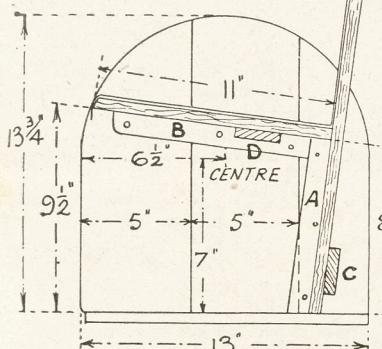


Fig. 1—Side view of parts with dimensions

To get the semi-circular top of the side, proceed as Fig. 2 explains. First measure 7 in. from the lower end of the boards and then set in a point centrally as shown. This will give the centre from which to strike the arc, see Fig. 1. Now take a piece of odd wood, say,  $\frac{3}{16}$  in. or  $\frac{1}{4}$  in. thick, and about 8 in. long, mark off two points on it  $6\frac{1}{2}$  in. apart and drill holes through each point. Place one of these holes over the centre point on the board and drive in a small nail, leaving the slip of wood to move freely round the nail.

Next place a pencil point through the other hole in the wood and describe the semi-circle, just as seen in Fig. 2. Of course, if a pair of reliable compasses are at hand, the foregoing work can be cut out and the semi-circle drawn direct. It only remains now to cut round the line with a coarse fretsaw and afterwards clean the edge with glasspaper.

## Second Side

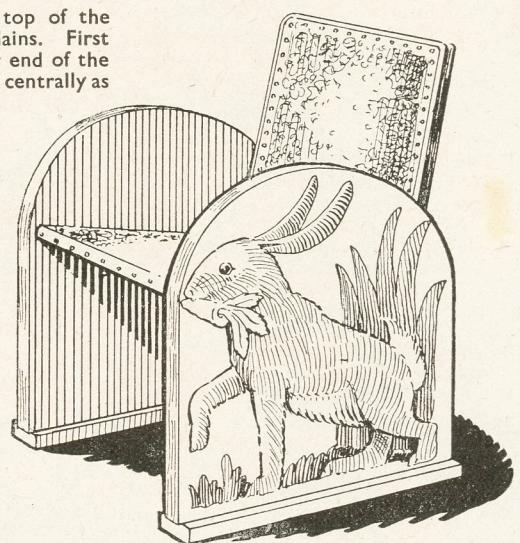
The second chair side will be made similarly to the first one just described, and the finished board can be used as a template for drawing round to form the semi-circular top. The two battens (A) and (B), Fig. 1, will next be prepared and nailed on. Piece (A) is 8 in. long and piece (B) 9 in. long and both will be cut from stuff 1 in. by  $\frac{1}{2}$  in. in section.

To get the true position for these pieces, set out the measurements of  $9\frac{1}{2}$  in. and 8 in., shown in Fig. 1, and draw in the connecting lines across the board.

The back will be also made in three widths or two widths of battens to make up 11 in. overall. Tongued and grooved stuff will be used and glued up, with the upper corners rounded and the sharp edges taken away. A 2 in. by  $\frac{1}{2}$  in. batten (waste wood from the main back pieces) will be glued and nailed along near the bottom edge to stiffen the whole, as seen



Fig. 4—An elephant decoration



in (C), Fig. 1. Glue and screw the back between the sides and put in long nails into the battens (A) each side.

## The Seat

For the seat again three pieces each 11 in. long will be glued and with the front edge rounded off. A 2 in. batten should be moulded across the three pieces and nailed securely, as seen at (D) in Fig. 1.

The feet which are screwed or dowelled through to the sides are of  $\frac{1}{2}$  in. stuff about  $1\frac{1}{2}$  in. wide, as seen in Fig. 2. Both pieces should be very securely fixed and any sharp angles and corners cleaned off.

## Padding the Seat

Almost any strong material will answer for the seat and back covering, but it would be preferable to have leatherette or some such strong material that can be washed or kept clean with a damp cloth. The seat could be stuffed just sufficiently to take away the hardness of the wood, and after the covering material has been pinned down on three sides, the stuffing material should be put in and the remaining side pinned down.

(Continued foot of page 162)

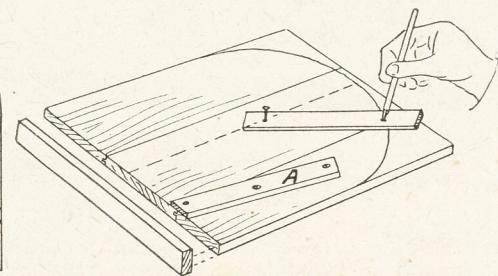


Fig. 2—Marking the top curve

# Get a professional finish by knowing all about HOW TO LACQUER

PROBABLY no finish for woodwork has such lasting results as lacquering. Many examples of such lacquered work can be seen in museums and in private houses, many years old and still retaining much of their original lustre. For such articles as small cabinets, photo frames, etc., such a finish is simply ideal and worth all the trouble it involves. Those readers who may care to try their hand at the work will find the following instructions of value.

The first thing to do is to make the surface of the wood glass-smooth and make good any defects. The lacquer for the process is made from 5oz. of pale shellac, dissolved in 1 pint of methylated spirits. Keep the bottle in a warm room and away from a naked light, and assist the dissolving process by shaking the bottle at intervals. When the shellac has dissolved, add  $\frac{1}{2}$  oz. of camphor. This is the clear lacquer.

## The Undercoat

Now apply a coat of the lacquer to the article, and when it is dry rub it over with a piece of worn glasspaper to smooth the surface. Over this an undercoat is to be applied. Make this up as follows, the quantity of the ingredients being increased, or decreased proportionately according to the size of the article.

Make a paste of 1lb. whiting and 1 pint of water, beaten up to smoothness. To this add 1oz. gelatine, and heat over a low jet until the whole is well amalgamated until of the consistency of thick cream. Apply this to the work liberally, using a stiff brush. Let it dry, then rub it over with grade O glasspaper until a smooth matt surface results.

Go carefully over this part and be cautious at the angles not to penetrate the undercoat to the wood surface beneath. Much depends on this part of the work being carried out successfully. Then dust over and wipe clean.

## Coloured Work

The coloured lacquer is prepared with dry colour added to a quantity of the clear lacquer. Suitable dry colours are vermillionette, drop black, and emerald green; other colours as required. The colour is put into a vessel and the lacquer added, the whole being well mixed to the consistency of cream.

The lacquer is applied and allowed to dry, when it is rubbed over with the glasspaper. Repeat this until 6 coats of lacquer have been laid on, allowing a longer time between each successive coat for the lacquer to dry. The work of lacquering cannot be hurried.

When the last coat has been put on, and is quite dry, flat the surface with powdered pumice stone, sprinkled on a soft linen rag. This should be done with care and patience, and should leave a matt surface, ready for any decoration. The decoration should be in lacquer as well, but made a little thicker by adding more of the dry colour.

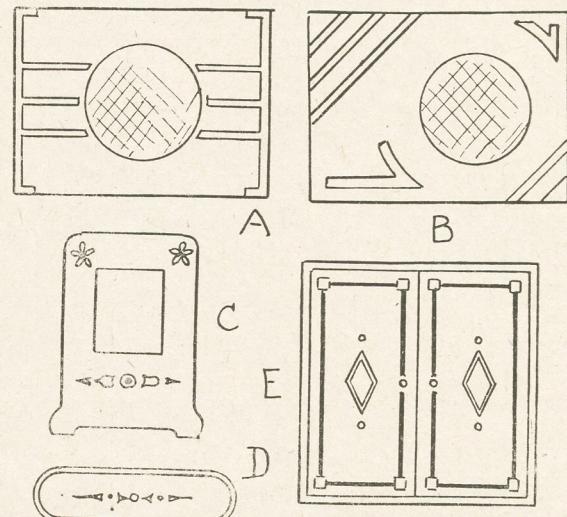
## Simple Forms First

Beginners at the craft would be wise not to attempt anything too ambitious at first. Simple forms will look well, especially if done in brilliant and contrasting colours. Some suggestions to this effect are given. In the examples at (A) and (B) the decorations are simple bands of colour, and would suit a wireless cabinet or similar article. If these bands could be bordered with gold, a rich effect would result.

In all cases the pattern should be gone

over several times, not once. Golding is quite easy. For the work, gold size and bronze powder are needed, the gold size being tinted with a little red waterproof drawing ink to show up better and increase the richness of the gold.

Paint the lines to be gilded with the gold size, and when the size is tacky, apply the bronze powder with a tuft of



cotton wool. Try this on a spare bit of wood first, as unless the size is of the right degree of tackiness, some of the cotton wool may stick on and be a nuisance to remove. A good test is to press the finger on the size; if it sticks but does not pull the size away then it is O.K. The work must now be clear lacquered all over.

## Six Clear Coats

Apply six coats of the clear lacquer, glasspapering each coat, as done for the coloured lacquer. The last coat should be smoothed down with the pumice powder. Then dust over and polish with linseed oil and whiting. The work, as will be understood by the foregoing instructions, demands some patience, and takes time, but the results, if well done, will last a lifetime.

Suggestions for decorating a cabinet of the cupboard type, is given at (E), a straightedge of wood being used, if considered necessary, to guide the brush. Some simple decorations for a photo-frame, (C) and back of a clothes brush (D) will help also.

## Some More Home Cements—

### Marble Cement

A simple and excellent cement for repairing marble is made by beating the white of an egg with flour till the mixture is of the thickness of thin paste. This cement will withstand even hot water, and, as it is white, is not easily noticeable. Bleached shellac or plaster of paris may be used instead of flour if desired.

### Liquid Glues

A strong liquid glue may be made by heating together on a water-bath for four hours 100 parts of Scotch glue, 100 parts of gelatine, 25 parts of methylated spirit, 2 parts of alum, and 200 parts of a 20 per cent solution of acetic acid.

Another good formula is comprised of 65 parts of water, 25 parts of Scotch glue and 4 parts of Nitric acid; and yet another is made by dissolving 6 parts of glue or gelatine in 4 parts of solution of lime which has been previously neutralized by adding one-third of its weight of oxalic acid. Carbolic acid may be added if desired to act as a preservative.

### Bookbinders' Glue

Ordinary glue can be easily converted into the elastic variety used by bookbinders by the addition of a little glycerine, the excess water being expelled by continued boiling—until the glue is of a nice workable consistency.

There are some good bargains in our advertisement pages which are always worth reading.

Patterns are provided on page 175 for making  
**A 28-YEAR CALENDAR**

CALENDAR making has always been a popular and profitable occupation with our readers, and a great number of designs have appeared. Here, however, is a distinct novelty—a calendar for 28 years (1941-1968). No—(with apologies to our numerous readers north of the Tweed)—this is not a thrifty Scottish idea for making one calendar last 28 years instead of just one year.

There are plenty of occasions where it is useful to have a calendar for a year or two ahead (or back), to see, for example, when birthdays and other anniversaries occur. Some good diaries have calendars for the previous and the next year in addition to the current year, but this is not always the case.

### **Patterns Provided**

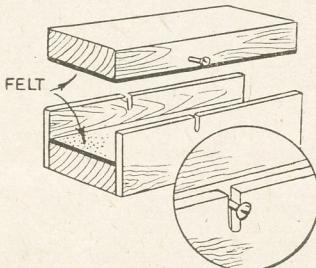
The calendar (full-size patterns of which are given on the inside back cover) is quite simple to make, very little cutting being required. We will first assume that the majority of those who make it will be fretworkers, and will use wood or thin plastic sheet. For a very simple job, however, it can simply be made of cardboard. This will not make such a good job, but may recommend itself to those who have few facilities for sawing.

On the other hand, there may be readers who are good mechanics or apprentice toolmakers, etc. It would be excellent practice for them to make this article in, say, sheet brass, punching the letters and numerals, or etching them. This would certainly make a job that would last 28 years.

The circular disc should be stuck down on thin plywood or plastic sheet. Normally, in fretwork, we use paste for this purpose, as the design is glass-papered on afterwards, but in the

## Knife Cleaner

**F**IRST get a piece of wood 9ins. by 3ins. by  $1\frac{1}{2}$ ins. and nail to each side 3-ply 9ins. by 3ins. At the top of the 3-ply cut V  $\frac{1}{4}$ in. deep. Nail or glue



piece of carpet or felt on bottom. Make lid to fit inside and cover bottom of lid with carpet or felt. Fix

present case we would do well to use thin glue (mix some tube glue with a little hot water) as the design remains on the material.

The front rectangular pattern can be stuck down in a similar way, but it might be better to trace off the outline and the two curved slots, cut them, and then, when the wood or plastic sheet has been nicely polished, the figures glued into place. Take care to get the curved slots nicely cut.

The two struts are cut from thick material—as thick as possible—provided they do not foul the circular disc when this is fixed in position. Note that in order to get the patterns conveniently on the sheet, these two strut pieces have been turned around. The actual bottom is marked 'base'. These struts are glued and also nailed, using fine panel pins.

A small nut and bolt will secure the disc to the front panel. There should be a thin washer between the parts, and a wing nut is better than a plain one, since the friction can better be regulated.

## How to Use It

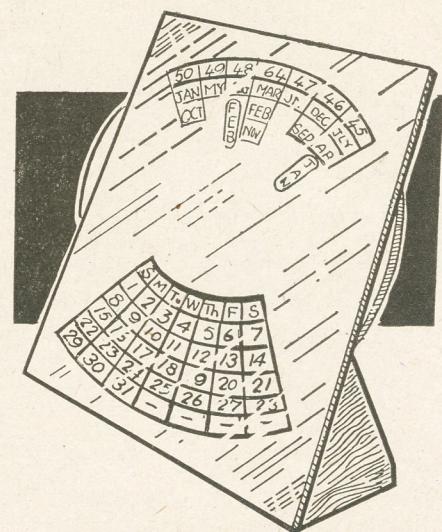
To use, turn the disc (which projects very slightly from the edges of the front panel) until the figure indicating the year appears over the required month, at the top. The calendar for that month then appears on the lower half. The calendar is altered every month. For leap years, however, the *ringed* January and February are used (i.e., the February which is in the August column and the January which is in the July-April column.

Decoration may safely be left to the

a nail each side to remove for renewing powder. To use, first cover carpet with bath brick and replace lid. Slip the blade of the knife between the carpet and draw in and out several times turning over the blade when one side is done.

## To Pierce a Coin

TAKE an ordinary cotton reel or bobbin, and place the coin over the hole at the spot where you wish to pierce it. Then push a thin nail through a cork and put it upon the coin. Hold the cork tightly and give the nail a few sharp taps with a hammer, when it will pierce the coin at the required place. Be sure that the nail is immediately over the hole in the cotton reel.



reader. If the model is made in plastic sheet, this can be polished and the paper pattern for the numerals, etc., stuck on afterwards. The same applies to a good wood, such as oak-faced ply. If cheap ply has been used, the wood can be blacked with a glossy black enamel or any other colour may be used—pastel shades, for example. In the latter case, small floral designs can be stencilled or painted on.

If the model is made in metal, various ornaments can be punched on or engraved.

The struts can be dispensed with and the calendar hung from a wall if so desired. Readers who are keen on geometrical setting out may be able to make, in thin card, a miniature version of this model, about the size of a pocket watch. Such a calendar can be kept in a diary.

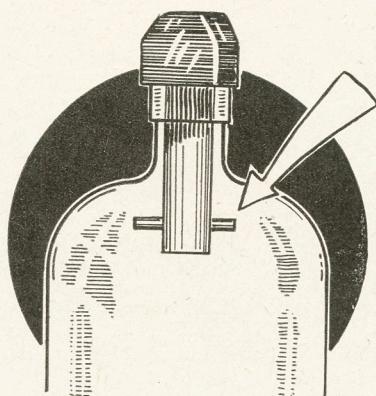
### An Enlarged Size

On the other hand, the calendar can be made much larger (and more robust) and, with a suitable advertisement painted on, hung on the wall of a cafe, etc., so that patrons can (as hinted at the opening of this article) find on what day their birthday, Christmas Day, etc., falls next (or any) year.

Whichever way it is made, this is sure to prove an interesting novelty, and some readers may care to ferret out the principle behind this. And, if past experience is any criterion, many of these readers will be with us in 28 years time. There are many who have already been with us for 28 years and are still happily occupied in making the various projects we publish!

The suggestion for this calendar, by the way, was actually made by one of our enthusiastic readers, to whom we are greatly indebted—18-year-old land Plowman of Gosport, Hants.

# How the nail got into place will prove to your friends A "CORKING" MYSTERY



**O**F all the bottled mysteries, the Ship In The Bottle is, of course, the most famous, and not long ago we published an article on this. There are other bottled mysteries, however, quite puzzling to those not in the know, and not at all difficult to make, at practically no cost.

We show herewith a bottle that has a wooden stopper carved or turned in wood, rather like a cut glass stopper of a decanter, etc., in shape. It extends a short way past the neck of the bottle where it has a nail driven through it, crossways, the nail sticking out each end. The wooden 'cork' is fairly loose in the neck so that it can be withdrawn a fraction of an inch until the withdrawal is barred by the crossways nail.

The point is, how does the nail come to be there?

We hear a lot about 'bottlenecks' in connection with industrial production. In fact, the word is very much over-worked and often wrongly used. But you can use this as a patter 'line'. You can safely offer a ten pound note to anyone who can prove that it is not the same nail, in one complete part, that goes through the stopper.

Naturally, you have first glanced at the diagrams which, of course, give the game away.

## A Suitable Bottle

First, get your bottle. For practice attempts, common medicine bottles may be used. When you are an expert and wish to make a super model, you should look around on market stalls where china and glassware junk is sold, for a good-looking bottle. It may be a solitary survivor of what was once a set of wine decanters or scent bottles, etc., which now, separated from its companions, and with its silver-headed stopper missing, is going for a few coppers. It should, if possible, have a rather square neck. As you read these notes you will discover the chief requirements.

## The Stopper

First, make the wooden stopper. This

can be carved entirely from wood or can be part turned and part carved. It should be an easy fit in the neck of the bottle, and project an inch or so below the neck (see Fig. 1).

A slice must very carefully and neatly be cut off the top of the stopper. Keep it carefully as it has to be re-glued.

The next step is to drill a small diameter hole through the centre, the long way, but stopping within about  $\frac{1}{2}$  in. from the bottom. At this point, drill another hole across at right angles to the first, so that you have what amounts to an inverted T-shaped channel. (Fig. 2). In this figure, the top is shown removed. There is not another hole here.

The short hole is just a trifle larger in diameter than that of the nail to be used. A study of Fig. 4 will show that the nail cannot be longer than distance (X) in the method now under consideration. The nail is cut this length, and a groove filed round its middle. (Fig. 3). For convenience, a short plain metal rod is shown, but this may well be a real nail with head and point.

A piece of fine but very strong thread is passed down the long central hole and when it gets to the bottom, it is pushed through the short hole with a piece of matchstick, etc., so that the end emerges, the whole thread running round at a right angle.

## Another Method

There is another method (and, though we are getting a little ahead, one that will probably have to be used in an alternative method), of getting the thread to pass round. This is to take a length of fine wire, such as the thicker variety of fuse wire, and make a very small loop at one end, the diameter of the loop being slightly smaller than the diameter of the long hole. This is passed down the long hole so it coincides with the short hole. The thread is then passed through the short hole and, incidentally, through the wire loop. Allow plenty of thread to run through. Then, retaining one end of thread, pull on the wire, gently, and pull the other end of the thread up the long hole.

Take the thread that comes from the short hole and tie it firmly to the groove in the nail. Glue it there and also glue the thread lightly along one half of the nail, between the groove and its end.

Having made sure the bottle is clean, we can now tackle the most interesting part of the job—that of getting the nail through the stopper.

With the nail hanging down, insert the stopper in the bottle. Pull very gently on the thread so that the nail comes against the hole (Fig. 4). Then continue to pull so that finally the nail is drawn halfway in, and the notch is central with the long hole. As you pull, the thread will peel away from the nail, so to speak,

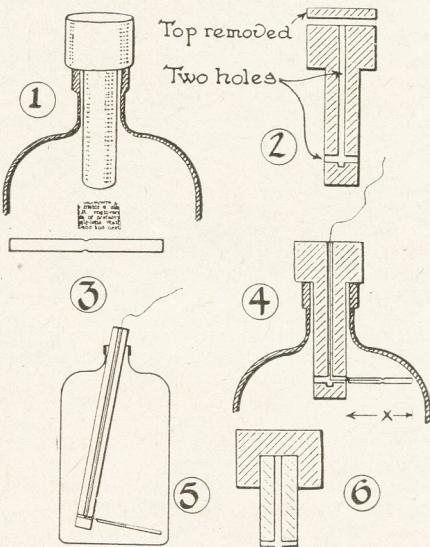
as the nail passes the half-way mark. The thread should not have been glued too well down except at the very centre.

A little patience may be required to get the end of the nail well and truly in the hole. In very obstinate cases, a kind of hook may be made from thin wire and this inserted through the small space left between the bottle neck and the stopper. The free end of the cotton is now glued very securely in the end of the hole.

## Fixing the Top

The last stage is to re-glue the slice cut off the top of the stopper so neatly that it will not show. When it has set, the stopper top may be shaped, and this further disguises the sliced-off and re-glued top. Stain the top a dark tone . . . even black, and polish well. The mystery is now complete.

It would look better, of course, if the nail could be longer still. Fig. 5 shows

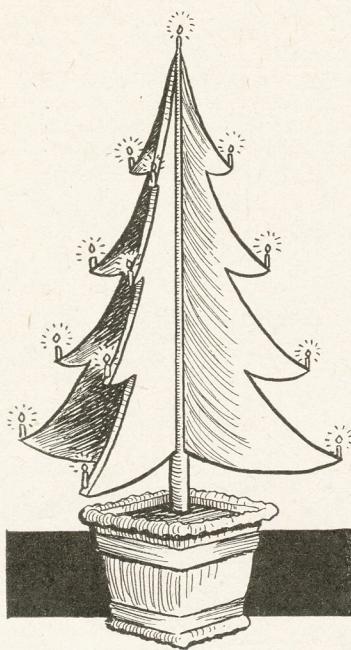


one way of managing this, though it is more difficult. A very long stopper is first made, or rather, a plain dowel with the holes drilled as before described. This is slanted as shown, so that a bigger nail can be got in. When it is in, the long stopper is pulled up and most of it is sawn off, taking care not to sever the thread. A separate cap, of wood, is turned, as in Fig. 6 and glued over the top of the stopper. If well done, it looks as though the stopper is of one piece.

## Another Idea

Instead of shaping the wooden top and re-gluing the sliced off piece, a lavish supply of sealing wax may be put on the end, much as bottled ships are sealed, but this does not look quite as good, and conveys the impression that one has something to hide. In any case the novelty is worth attempting because it will cause fun and mystery to hand round.

# There are many advantages if you make an ORANGE-BOX XMAS TREE



**A**N 'orange-box' Christmas tree has many advantages. Its formality of design helps in the planning of its decoration and the dressed tree can be very effective. It is more stable than the small branches of pine which are so often supplied these days to serve as trees, and it can be loaded without fear of sagging.

Its rigid branches are safer, too, for illumination by candles, especially when the young people are apt to get a little over-excited.

Most greengrocers will oblige with an orange-box at a small cost. A little patience is needed in taking the box apart, to avoid splitting the thin wood panels. The boxes are generally of standard size, being 28in. long, 15in. wide and 12in. deep, with a centre partition put in for strength. The sides are made up of pieces approximately 6in. wide and  $\frac{1}{4}$ in. thick.

Select four pieces which are not split or broken. It matters little if the surface is rough, in fact, it is an advantage if they are somewhat ragged. Plane up one edge of each piece square and true, and with a thin brushing of glue make rubbed joints to produce two boards 28in. long and 12in. wide. Mark the three diagonals, as shown in Fig. 1, and plot out the shape of the segments which are to form the bulk of the tree. The segments can be cut to shape with a fretsaw.

The stem or trunk of the tree is made from a piece of broomhandle, 41in. long. Four grooves,  $\frac{1}{4}$ in. wide and  $\frac{1}{4}$ in. deep, are cut, north, south, east and west along 28in. of its length. These grooves can be taken out with a grooving plane or with a cutting-gauge and a  $\frac{1}{4}$ in. chisel.

Alternatively, the stem can be fashioned from a length of 1in. square wood, the corners being rounded off afterwards. In cutting the grooves the square-sectioned wood is easier to handle than the round broomhandle.

The sides for the 'pot' are cut from the two thick ends of the orange-box (Fig. 2), while the top cover and the bottom are provided by the middle partition (Fig. 3). The pot is simply nailed together in the form of a box, the bottom being raised  $\frac{3}{4}$ in. from the lower edges (Fig. 4). The top cover is not nailed in the assembly, but is made to drop squarely and rest on  $\frac{1}{2}$ in. fillets nailed to the sides.

Before assembling the tree, the segments should be treated with a wash of green stain or dye. Green writing ink, diluted with water is quite suitable, and the stain is more effective for the purpose than paint, particularly if the surface of the wood is at all ragged.

The stem and top cover (A) should be coloured brown with walnut stain. The pot can be painted, but it will look a lot more 'Christmassy' if its hard lines are covered with a frill of brightly-coloured crêpe paper.

The building of the tree is completed by gluing the four segments securely in the grooves of the stem. It is best to work on a pair only at a time and allow the glue to harden on the north and south before attempting to fit the east

and west pair.

When all four are assembled and the glue has set hard, taper off the top 2in. of the stem so that it finishes in a point (Fig. 5). The bottom of the stem is dropped in through the hole in the top cover (A) and is secured with a 2in. round-headed screw inserted through the hole in the bottom of the box. A washer should be placed on either side and the screw left sufficiently slack to allow the stem to revolve easily (Fig. 4).

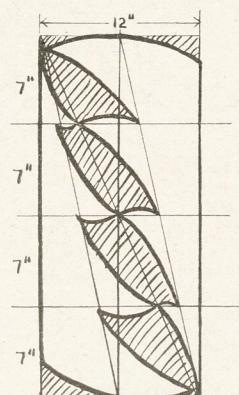
Candleholders for the top of the tree and the 16 branch tips are made from slips of tinplate or brass,  $1\frac{1}{4}$ in. by 1in., with a  $\frac{1}{2}$ in. cut in the middle of each side (Fig. 6). The lower half is bent at the dotted lines and the upper half curled round to form a spring grip for the candle (Fig. 7).

The tree can, of course, be illuminated by a complete string of electric lights, sold specially for such purpose, or a series of flash-lamp bulbs can be fitted at the branch tips, the batteries being hidden away in the pot beneath the top cover (A).

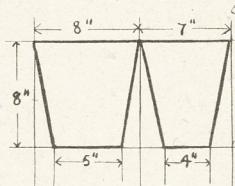
The scheme of decoration with tinsel, glass baubles and 'frost' is a matter for personal taste, but it will be found much easier to arrange on the formal structure of the orange-box tree.

Decorations and gifts are hung on small  $\frac{1}{4}$ in. hooks which are screwed in wherever they may be needed on any part of the tree. If the tree is being very heavily loaded, it is advisable to put something heavy, such as bricks or flat-irons, in the pot to act as a counter-balance.

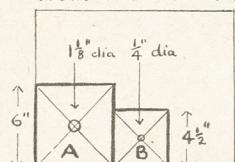
On clearing up, it will be found that there is enough wood left over from the orange-box to make several small toys and little gifts for putting on the tree.



Cut 2 sets of two from 6" side pieces planed square and glued (Fig 1)

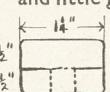


Cut 2 sets of two from ends of box (Fig 2)



Cut from middle division of box (Fig 3)

Assemble by gluing branches in grooves of stem. Taper off top when glue is hard (Fig 5)



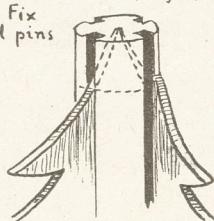
Metal slips for candlesticks cut 17 (Fig 6)



Bend candlestick to fit candles and tree. Fix with small pins (Fig 7)



Details of bucket and pivot screw (Fig 4)



# Everyday substances for interesting experiments in CHEMISTRY AS A HOBBY

**N**OW, what is analysis? Well, from the chemist's point of view everything is composed of one or more (usually more) of 92 different 'elements'. The analyst's job is to find out which of these elements are present in the substance he is testing.

The elements can be divided into two groups—metals and non-metals—and the analyst has two distinct methods of testing for these groups. Another branch of analysis tells the chemist *how much* of each element is present, but as this form of analysis is rather complex we shall not deal with it here.

Although most people consider chemical analysis to be a very skilled task, within certain limits anyone can conduct a reasonably simple analysis and derive a fair amount of pleasure from it and no small amount of instruction. It is necessary, of course, to have a fairly good chemical set and one or two special chemicals, but these can be obtained for quite a small outlay. One or two bits of apparatus can be knocked up from wood in a few minutes. A simple form of apparatus is seen in Fig. 1.

## Preliminary Tests

Before starting on the usual scheme of analysis, one can obtain a good guide as to the constituents of a substance by a number of simple preliminary tests. One of these is simply to heat the substance, at first gently and then

When doing this experiment, you just place about as much of the substance as will cover a farthing (get used to working with small quantities; it saves money!) in a small test tube and heat it in a bunsen flame. By the way, until you get a bunsen burner, the ordinary gas ring or spirit flame would do for most things.

## A Simple Experiment

The next preliminary experiment is called the flame test. Here, a very tiny amount of the moistened substance is gathered on the end of a loop of platinum wire and held in the flame. Many substances when treated like this colour the flame; there may be no change in the colour of the actual substance.

The flame test is useful because the merest trace of a particular element will give its characteristic colour. The test can be made even more certain by looking at the flame through a piece of blue glass. The following table shows you what result you are likely to get.

| If present— | Will give flame colour— | Through blue glass— |
|-------------|-------------------------|---------------------|
| Sodium      | Golden yellow           | No colour           |
| Potassium   | Lilac                   | Crimson             |
| Calcium     | Red                     | Green               |
| Strontium   | Crimson-red             | Crimson             |
| Barium      | Light green             | Dark green          |

For ease in handling, the platinum wire is pushed into the red-hot end of a piece of glass rod and allowed to cool.

## Another Test

Another very useful preliminary experiment is the borax bead test. To do this you make your platinum loop red-hot and dip it into ordinary borax before heating it in a strong flame. The bits of borax will swell at first and then shrink to a colourless, transparent bead which is used in the test (see Fig. 2).

The moist bead is dipped in the substance to pick up some grains. It is then heated first in the outer flame of the bunsen and then in the inner flame. These are the results you will obtain.

| If present— | Gives in outer flame— | Gives in inner flame— |
|-------------|-----------------------|-----------------------|
| Copper      | Blue or green         | Colourless or red     |
| Iron        | Yellow or brown       | Bottle green          |
| Chromium    | Emerald green         | Emerald green         |
| Manganese   | Amethyst              | Colourless            |
| Cobalt      | Deep blue             | Deep blue             |
| Nickel      | Brown                 | Grey or black         |

These are the simplest and best preliminary tests. In a future article we will deal with the systematic detection of the elements, but before ending we ought to consider one of the most important principles of analysis and that is precipitation.

## Liquid and Solid

Under some circumstances when water solutions of two substances are mixed a solid separates out. This operation is called precipitation. As an example let us take a weak solution of silver nitrate and a weak solution of

sodium chloride. When these two are mixed, a white precipitate of silver chloride forms.

Thus, by adding sodium chloride to a test solution we can tell if silver is present, and by adding silver nitrate to a test solution we can tell if a chloride is present.

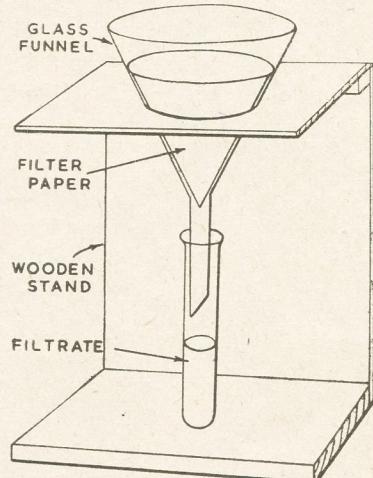


Fig. 1—A simple piece of apparatus

By means of the apparatus shown in the diagram the precipitate can be separated from the filtrate, and we can carry out further tests on the latter to see if anything else is present.

Another example of precipitation uses a solution of barium chloride. This precipitates sulphates as barium sulphate and conversely a solution of a sulphate will show whether barium is present.

## Practical Analysis

Here is a hint to keep you going until next time. There is enough information in this article to enable you to analyse table salt, glauber salts, blue vitriol, green vitriol, sal ammoniac and plaster of paris. Remember to do each test on a separate portion of the test substance and when working with plaster of paris, boil a very little amount with a fair quantity of water for getting a solution. The next article will contain the chemical names of these substances.

(To be Continued)

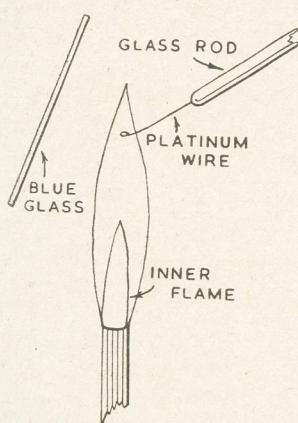


Fig. 2—The borax bead test

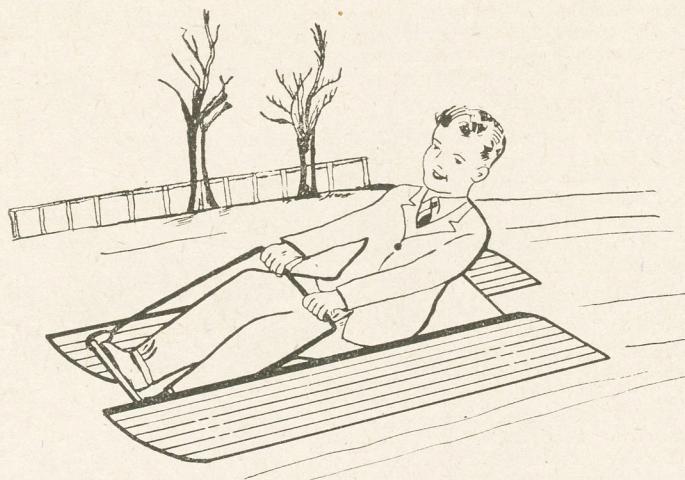
strongly. Many substances change colour when treated like this, as the following table shows. In addition, compounds of ammonia give off this pungent gas when heated.

| SUBSTANCE                | COLOUR<br>COLD | COLOUR<br>HOT |
|--------------------------|----------------|---------------|
| Zinc Oxide               | White          | Yellow        |
| Mercuric Oxide           | Red            | Black         |
| Red Lead<br>(Lead oxide) | Red            | Chocolate     |
| Tin Oxide                | Straw          | Yellow-brown  |
| Bismuth Oxide            | Yellow         | Brown         |
| Copper Chloride          | Green-blue     | Brown         |
| Copper Sulphate          | Blue           | White         |
| Cobalt Chloride          | Crimson        | Blue          |

## A Steady Oil Stone

A trouble often encountered in using an oilstone is that it slips backwards and forwards when in use. A good plan to prevent this is to add a small foot under each corner. This should be of rubber—a square pencil eraser or piece of inner tube serving the purpose well if nailed and glued firmly in place.

# Be ready when snow comes, by commencing now to make A TOBOGGAN



VERY good sport can be had with the toboggan herein described, and being sturdily designed, will give many years of hard service. The drawback with most is the difficulty of easy transportation, and storage also presents its own problems due to the somewhat unwieldy and cumbersome construction that is often employed.

The subject of this article has, however, been designed to eliminate as far as possible those faults enumerated above. Dismantling can be accomplished in a minute or so, which is a great asset when storage space is at a premium. The seating space of the toboggan is for either two normal adults or three juveniles, but the dimensions can, of course, be modified to suit individual requirements.

The difficulty that many readers are likely to experience in the construction, is timber supplies, due to the limitations imposed by the Timber Control. In this case, a visit to a secondhand timber yard will doubtless solve the problem. Moreover, the timber will be

thoroughly seasoned, and not inclined to develop warps and shakes in use.

The sides of the toboggan are constructed from two lengths of 6ft. by 8in. by 1½in. timber, shaped as illustrated in Fig. 1. Two pieces of 4ft. by 2in. by 2in. are bolted in the middle of each side, 6in. from the rear ends.

The iron runners are constructed from two suitable lengths of mild iron, 1¼in. in width and not less than ½in. in thickness. These are screwed to the

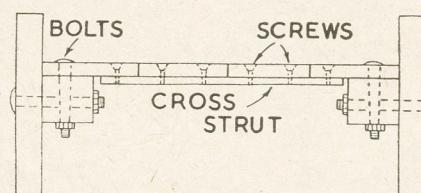


Fig. 2—End view showing runners and fixing

underpart of the sides by 1¼in. brass or copper screws, taking care to see that the heads are well countersunk below the surface of the runners.

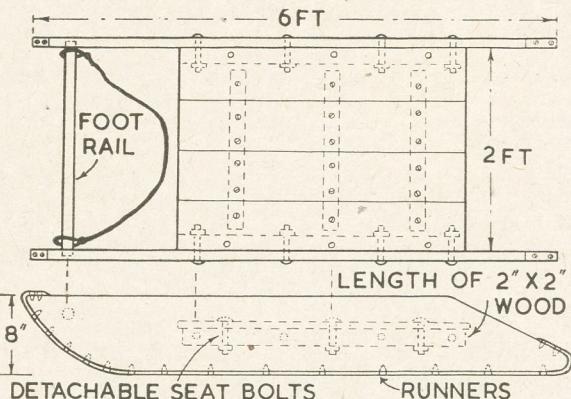


Fig. 1—Plan and side view with dotted details of seat, fittings, etc.

well glasspapered, given a coat of primer, and finished off with two coats of bright enamel paint. The top portion of the seat is perhaps best left smoothly papered, although it is advisable to finish all the under parts with a bituminous paint, as snow water has a very penetrating action, and may eventually rot the woodwork.

## Assembly

The toboggan is assembled by first bolting one side to the seat, inserting the foot-rest in its sockets, then bolting up the other side. Interpose substantial washers between the nut and woodwork. A leather strap may be looped around the foot-rest prior to assembly, to serve as a grip-cord. It must of course be firmly screwed to take a strain in use.

## Exhibition Matters

MANY readers like to take part in Exhibitions to have their models in competition with others. This is always worth while because it proves whether a standard of work is good enough to win a prize or a special mention. If it is not, then you have the knowledge that the work must be better next time. A chance for would-be exhibitors is provided at Mansfield, Nottingham, when the Rotary Club are arranging to hold a Hobbies Exhibition next March. Those readers wanting to enter, however, must write away now because the closing date is Dec. 31st. The address is Mr. A. Ashworth, 11 Lichfield Avenue, Mansfield, Notts.

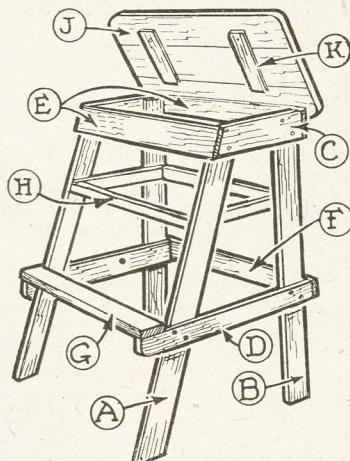
Those readers in and around Cheltenham should make a point of visiting the Rotunda early in the new year. A Hobbies Exhibition is being held there the first six days of January, after being opened on Dec. 31st.

# There are many uses to which you can put this SMALL KITCHEN STOOL

THE kitchen stool herewith described and illustrated has several uses. The housewife can sit on it or rest a wash-tub, etc., on it. She can stand on it to reach high shelves or tops of cupboards. There is a step to help her up. Then the lid is hinged and a box is underneath which may contain shoe-cleaning brushes and rags or dusters, etc.

## Space Saver

There is a modern trend in factories for multi-purpose tools. The kitchen is certainly the 'workshop' of the home. Yet space is too valuable for useless



A general construction view

furniture or items which duplicate uses. Even in the stool to be described, we have saved a few inches of space by having the front (on the step side) sloping and the other legs almost upright. If we had them sloping at the same angle more space would be occupied to no good use.

Common deal is used for this job, and is mainly of battens of about  $1\frac{3}{4}$  in. by  $\frac{3}{4}$  in. section (finished size). It should be pointed out that the job should be as light as is consistent with structural stability, as it is anticipated that the stool will be moved about a good bit.

## The Sides

The first step is to make the sides as shown in Fig. 2. These consist of styles (A) and (B) and rails (C) and (D). Fig. 2 shows how the battens are laid out (possibly on the floor). They are first cut longer than really needed, and after the parts have been screwed together the projecting pieces with the exception of the part that will bear the step (G), are cut off flush. Note that the sides do not slope at the same angle.

By the way, use screws, not nails. Some fellows who are ever ready to smack in nails make awful hard work of screwing when, actually, it is quite

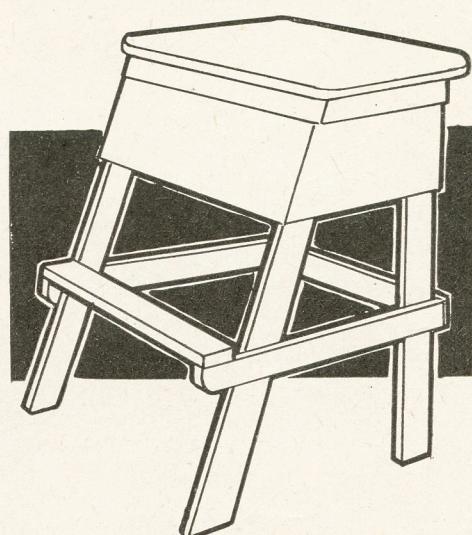
simple. Always drill a hole for the screw, and countersink the head. It is best to keep the countersink bit in a separate brace. A cheap or second-hand brace is good enough for this, and saves a lot of work in continually changing the drills and bits.

Having made one complete side, the other can be based upon it taking care, of course, that the rails are on the other side.

The two rails (E) and back rail (F) are all alike, and of the  $1\frac{3}{4}$  in. stuff, 15 in. long. Here again it is rather important to cut them an inch or two longer, to cut off after fixing, not only for neatness, but so as to lessen, greatly, the chance of the wood splitting. The top of rail (F) is 10 in. from the ground.

## Thick Rail

Rail (G) is now fitted. This is best made of rather thicker wood, and 2 in. wide. If a piece of oak or ash is available,



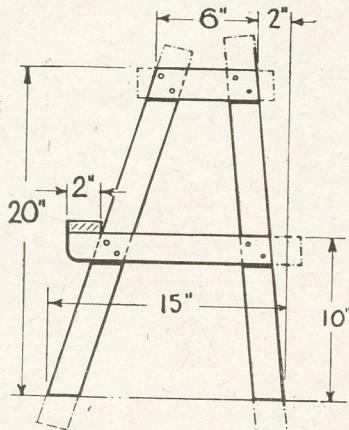
The stool with platform top ready for use

together with battens (K); care being taken to see that these battens come inside the box when it is closed. The top should project all round for an inch or so.

## Hinges

The top is hinged to rear rail (E). A lid stay (not shown in the diagrams) is recommended for the lid, as otherwise, every time the lid is opened and forced back, there is a strain on the rear rail (E).

An article of this kind does not really need any enamel or varnish, etc., as it will be frequently stepped on, etc. If being made for a present, however, it should be glasspapered smooth, and white, and one coat of clear varnish applied.



Side view with position of parts

use this. If continually stepped on, soft wood might, in this position, be splintered away too easily at the edge. If soft wood is used, however, the fore-edge of the step (G) can be well rounded over.

The small rails (H) are made of any convenient light stuff to hand, as they merely take the bottom and sides of the box, and no great strain is put on them. In the finished drawing, the plywood sides can be seen. No specific instructions are needed here.

## The Top

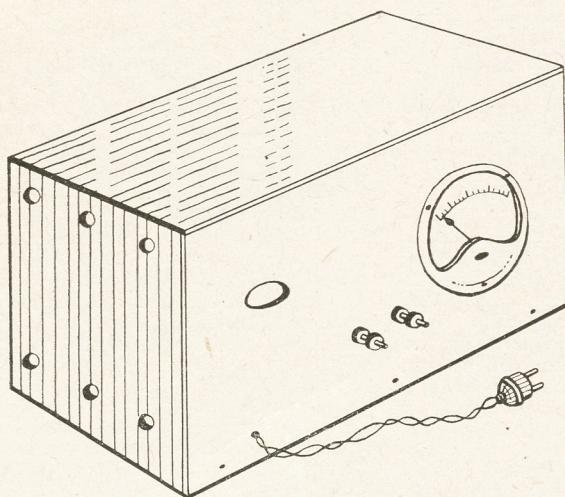
The top (J) can be made out of one piece of, say,  $\frac{3}{8}$  in. plywood if available, or two or three pieces of solid wood held

## Our Design of H.M.S. AMETHYST

THIS realistic waterline model of the valiant ship which ran the gauntlet in escaping from Chinese waters can be made from this week's gift design sheet. The complete kit of materials (No. 2824) is obtainable from Hobbies Branches for 2/9 or by post from Hobbies Ltd, Dereham, Norfolk, for 3/6 post free.



# For car or radio batteries it is economy to have A TRICKLE CHARGER



How the Charger will look when completed

**A** TRICKLE charger has a number of definite uses. It may be employed by the car-owner to keep his battery in proper order, thus assuring easy starting and good lights, especially during the winter when many vehicles are not driven sufficiently to meet the demands made by lights, etc., on their accumulators. The possessor of a battery-driven radio receiver can use it to keep his accumulators charged, as can anyone using accumulators for driving motors or other models.

The cost of operating the unit from the mains is very small indeed, while the initial cost of the parts required will be repaid quite soon.

## How It Operates

The circuit is shown in Fig. 1. The mains are connected to the primary of a transformer (a lamp being included in circuit as an indicator) which reduces the voltage to 5 to 20 volts or so. The rectifier then changes the output of the transformer into direct current for charging the accumulator, a meter being included to indicate the current flowing.

The whole is practically everlasting and suitable for any A.C. mains. It is not suitable for direct current mains, and the latter actually require no transformer or rectifier.

## Constructional Details

In Fig. 2 a complete wiring plan is shown. A wooden baseboard about  $\frac{1}{2}$  in. thick and 5 in. by 7 in. is used, with a plywood panel about 7 in. by  $4\frac{1}{2}$  in. If the unit is to be placed where children or others might touch the internal parts, then a complete box-shaped case should be made to enclose the whole. This case should have a number of holes for ventilation, and a hole should also be made in the panel opposite the bulb.

When wiring up, assure that the rectifier is properly connected and that no tags or stray ends of wire short-circuit any of the cooling fins. Some rectifiers have terminals or tags in different positions from those shown in Fig. 2. However, all are always clearly marked, red and black being used to denote positive and negative respectively where the usual 'plus' and 'minus' signs are not used. The other tags, for the Alternating Current Input to the rectifier, may be

## marked 'A.C.' or have a sign like a letter 'S'.

### Rectifier to Use

Many ex-government rectifiers are cheaply obtainable and a 12 to 24 volt,  $1\frac{1}{2}$  amp. size is useful. Any rectifier may be used at lower currents or voltages than the rated maximum. For example, the rectifier mentioned would be suitable for charging even a single 2-volt accumulator. Smaller rectifiers can be used, of course, if large batteries will never be charged, so it is only necessary to remember the maximum current and voltage which is ever likely to be required, when buying this part.

### The Meter

This indicates the rate at which the accumulator is being charged and assures the charging rate is not too high. (The maximum charging rate is indicated on most small batteries, being about 1 to 2 amps. Car batteries can take 10 to 15 amps. without difficulty, but will not receive so much from a charger of this type).

Any small meter reading about 0-2 or 0-5 amps. is suitable, but it must be an ordinary type suitable for charging circuits, and the special ex-R.A.F. and similar instruments intended for transmitter aerial circuits (R.F. and thermo-couple meters) should be avoided. If the meter pointer moves the wrong way, reverse connections to the meter terminals.

## Step-Down Transformer

A small transformer may be bought, or one to hand used. Small bell-transformers can be used, but the current must be kept down or they will overheat.

If an old core is available, or stampings can be obtained, a transformer may be wound, using a bobbin about 3 in. long and  $2\frac{3}{4}$  in. square, with a hole 1 in. square for the core. For the primary, wind on 1,840 turns of 30 S.W.G. enamelled wire in even layers, with a strip of paper between each layer. One end of this winding goes to the bulb holder and the other to the one mains lead. After covering the primary with a good layer of strong insulating material, the secondary is put on, using 20 S.W.G. wire.

This winding may be tapped at 80 and 120 turns (see Fig. 1), 160 turns being used in all. This will enable outputs of 10, 15 and 20 volts approximately to be obtained. Take care that no turns are shorted. For charging all small batteries (2 to 6 volts or so) 100 turns on the secondary can be used, but if larger batteries are to be handled at any time, extra turns will be required for these. If nothing larger than a 2-volt accumulator is to be charged, 80 turns will suffice for the secondary.

## The Bulb

Here, a full-sized lamp as used with the mains is employed. It has two purposes: to control the charging rate, and to show

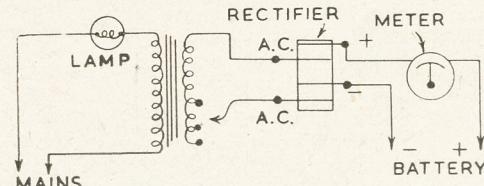


Fig. 1—The circuit of the trickle charger

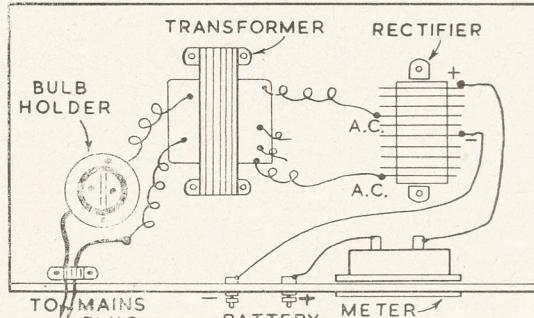


Fig. 2—The complete wiring plan

when the charger is in use. It will only glow faintly, when charging is proceeding normally. But if a short circuit develops in transformer, rectifier, or connections, or the accumulator is

(Continued foot of next page)

# Bits and pieces can be of use if you read these hints on MODEL ODDMENTS

**M**ODEL-MAKERS should take every chance to use oddments on their models. This is the true art of model-making, to amuse yourself, improvise and create and so interest others. The writer was quite recently on Television and this point seems to have been one of the most important factors mentioned by the Commentator.

## Cotton Reels

Cotton reels of all sizes should be kept aside. In building vehicles and models of all types these are most handy. Get a good variety, fat, stubby, long and spool type. The more the merrier. These can save endless expense as they make very realistic wheels. Being of soft wood, cut-outs made with a four-sided file can represent the tyre treads (see Fig. 1).

Boot polish is good for the covering. It is dull, without lustre and just the right shade.

Several types of wheels are shown and all are possible from reels. Ornamental parts on buildings can also be used by the cutting of reel sections.

Few people ever connect button moulds with model-making. Dressmakers sell them in most sizes from  $\frac{1}{8}$  in. up to  $1\frac{1}{2}$  in. and they are made from very soft wood. Just the thing, shape as shown in Fig. 2, to make that fine silver hub on that model heavy lorry. The centre can be finished with an eyelet used in leather work.

## Fire Escape Parts

In Fig. 5 you see how the writer makes up his realistic fire-escape wheels. Note that two moulds make the foundation held in place with small 'Lil' pins. Fix in the spokes, then fill in with plastic wood and glasspaper to the final shape.

Wire paper clips can always be straightened out and used for handles in making small sections on models. Ordinary wire

Fig. 3—Curtain ring steering wheel

**Trickle Charger**—(Continued from page 171)

connected in the wrong polarity, it will light brilliantly, thus to some extent safeguarding against damage.

The larger the wattage of the bulb used, the higher will the charging rate become. For normal use, something between about 25 and 60 watts will be suitable, but different bulbs may be inserted to adjust the charging rate, as mentioned.

## Important Notes

The meter cannot show any charging

for garden use is another good stand-by.

Aluminium and brass tubing of all sizes can be bought at model shops for about 6d. per length. Piano wire in about 12 thickness can be had for 3d. and 4d. a length at model aircraft shops. For stays on models one can also use cycle spokes. The writer finds these very handy.

## Tube Piping

In making some models you may wish to represent pipes, such as on a fire-pump. A stick of solder can be used for this because it bends very easily. The dome-top paper fastener is a good stop-gap for small lamps if you cut off the long ends a bit. Wire handles for winding up the lorry can be held by a very realistic strap of leather thonging used in lampshade making, which you can get at a handicraft shop. Black and brown are available. The writer also uses this to represent the ornamental beading seen on buses and vans and, of course, fire-engines. This is better than card because it is semi-rounded.

Small wheels are always a nightmare to the maker of tiny models. Most good model-shops stock all types of these solid model aircraft wheels from  $\frac{1}{8}$  in. diameter to 1 in. They will fill in many a gap. Pulley blocks as used on galleons make ideal pulleys on breakdown lorries and so on.

## Markings

Although the writer has been model making well over thirty years he still admits that lining and marking a model is the most difficult. For this reason he puts his markings on when the model is finished and mounts up his gold, silver or other shade on thin cardboard and then cuts this into strips. If it is on wood he

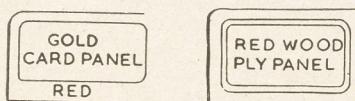


Fig. 4—Panel suggestions

glues it and then puts in small 'Lil' pins to hold it, snipping off the top afterwards.

Paper for markings can be bought in silver and gold about Christmas time, as it is used for decorative work. Nearly all other shades can be had at handicraft

current unless an accumulator is connected. When connecting any battery, always observe the polarity marked. If the charging rate is excessive, use a bulb of smaller wattage or take the rectifier to a transformer tapping which brings less turns in circuit. Once correctly set, the unit will need no alteration.

A number of batteries may be charged simultaneously, if required, by wiring them in series (e.g., charger to one negative terminal, positive terminal of same battery to negative terminal of

shops which stock packets of coloured paper for craft work. This is gummed and has a well-polished surface. Lines for a panel are difficult to make but are much better if a base is put on first on card, then the larger panel next which allows for the edge to show. Careful cutting is essential. The detail at Fig. 4 will help you with this very intricate work.

Vehicle radiators can be made with the thin mesh now sold by ironmongers. Back it with a paper or paint because if you do not do so, bare wood will show. In our model-making we often wish to show ropes, and the nearest to this is the type sold in model shops for yachts. As a rule the Irish make is correct.

## Use for Beads

Collect all the beads you can; these are the best stand-by for any modeller. Large ones make lamps for vehicles, railway buildings and so on, whilst

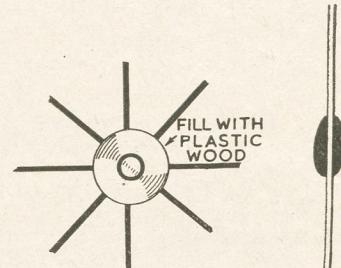


Fig. 5—Front and side view of spoke wheel straight types do for putting on winding handles. In the drawing of the steering wheel (Fig. 3) you will note that these are used to keep the wheel firm, and how effective it looks on the top. The wheel is made with the aid of a small curtain ring and struts made from tin cut to shape and turned over on the ring. Beads on the tops of brake clutches will also be very effective.

## Have a Savings Box

Seats on model vehicles can be made from wood and covered with passe-partout, of which maroon, black and brown is considered best.

Start a savings box now and you will be surprised how it will grow. Do not forget to save a few match-sticks and pipe spills; these are handy for ventilators, slats and small beadings.

next battery, and positive terminal of latter to charger).

As its name suggests, a trickle charger only charges at a low rate. It is, therefore, safe to leave the charger connected all night, if required, to bring accumulators into condition. The exact state of the latter can be determined by using a specific-gravity tester, readily obtainable from all electrical shops. When the charger is not in use, and when touching leads, withdraw the mains plug to disconnect.

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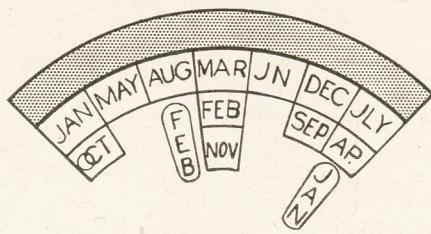
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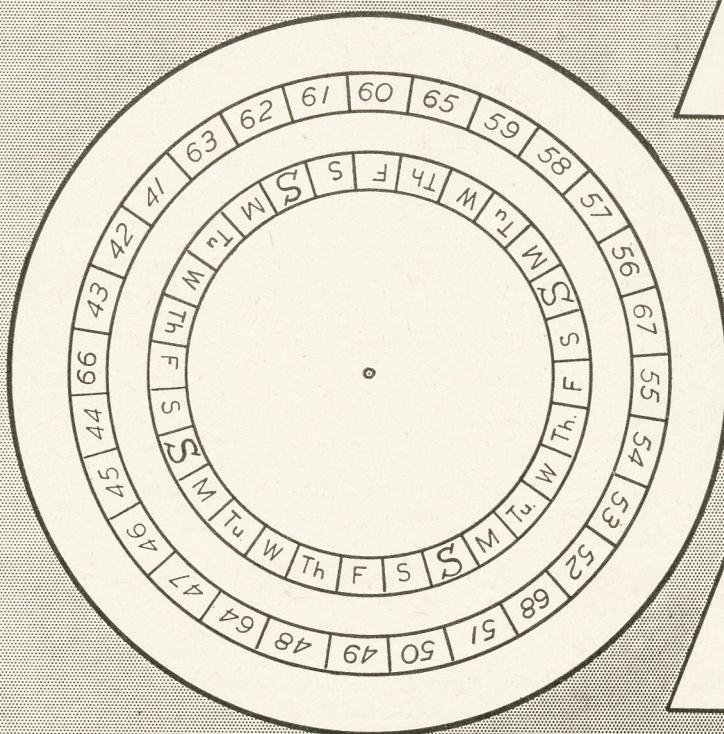
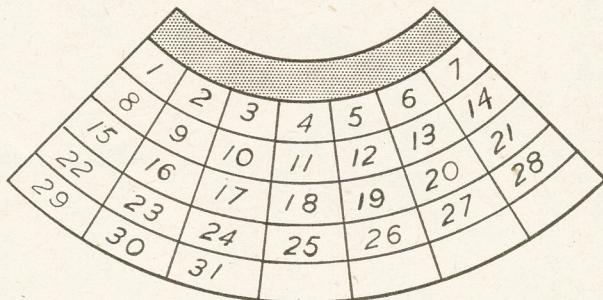
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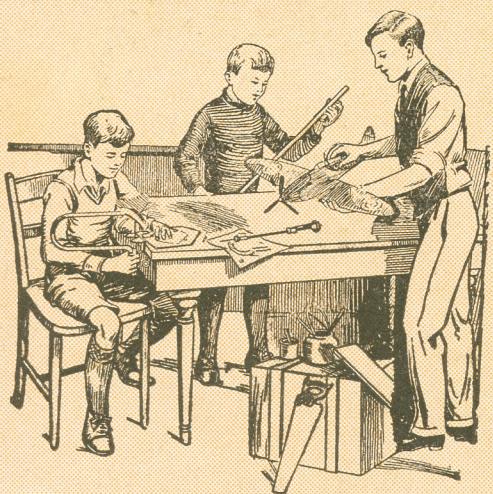
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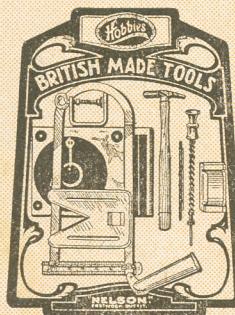


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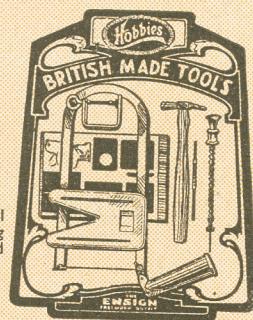
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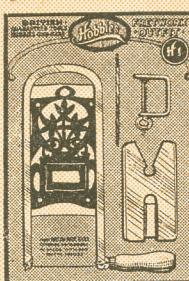
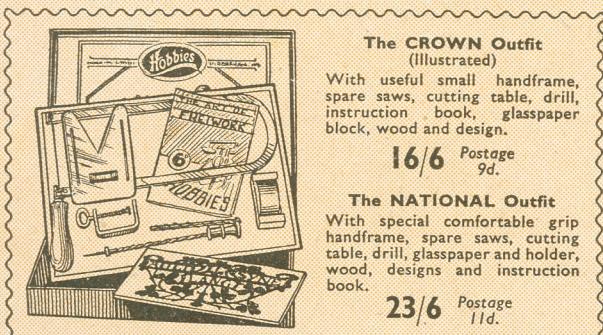
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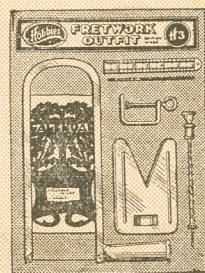
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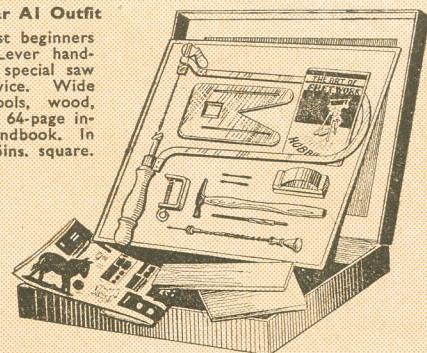


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